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LISTS OF SPECIES

Fish, Marmelos Conservation Area (BX044), Madeira River basin, states of Amazonas and Rondônia, Brazil.

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Abstract: The present study provides a species list of fish from the Marmelos River Area – BX044 in the states of Amazonas and Rondônia in northern Brazil. During a Rapid Ecological Assessment (REA) performed in October and November of 2003, 133 fish species from six orders and 24 families were recorded. The most diverse families were Characidae (47 species), Cichlidae (15 species), Loricariidae (12 species) and Pimelodidae (7 species). 23 fish species were common to the entire river basin and 4 were endemic to the aquatic system studied.

Introduction

In the most recent Brazilian Workshop held in Macapá City in 1999 to define priorities for the conservation and sustainable use of the Amazon, the Marmelos Area (BX044) was indicated as an *A* level priority for the assessment of fish fauna and other vertebrates. The Marmelos BX044 area is a unique ecosystem in the Brazilian Amazon, encompassing different forest formations, such as patches of grassland, *Ombrophylus* closed forest, open forest and savannas. These features, together with the potential endemism and proven fish richness, have led scientific authorities to consider this area as one of 385 priority areas for biodiversity conservation (Capobianco et al. 2001).

The BX044 area is included in the *deforestation arc* of the Brazilian Amazon. Its natural landscapes are in accelerated anthropogenic transformation and there is limited knowledge on fish fauna diversity (Capobianco et al. 2001). This indicates the urgent need to study the regional fish fauna in order to draft appropriate conservation plans and define new conservation units.

This paper contains the first documentation of the fish fauna of the Marmelos BX044 area in the Amazon. It is based on a field survey conducted during the PROBIO Rapid Ecological Assessment (REA) project. REA is a methodology used to survey diversity and current geographic distribution as well as elucidate the biogeography patterns of occurrence of the different taxa (Camargo et al. 2005). This approach also contributes toward determining priorities for regional conservation.

Knowledge on fish fauna diversity is important in defining potential land use. The ecological importance and geographic location determine the role of this area as an ecological corridor between the areas of the indigenous Tenharin.

Materials and methods

The BX044 area has 5,270 km^2 and is located between 08°02'52" and 08°54'46" S, and 60°50'24" and 62°10'13"W in the Madeira-Tapajós interfluve. This interfluve is characterized by restricted conservation areas, with no more than six per cent of the total area located in conserved units of direct and indirect use (Figure 1).

A field survey was carried out during October and November of 2003 at 23 sites located along the main courses, such as the Maderinha, Roosevelt, and Jatuarana Rivers and streams that drain different forest formations. Sampling was conducted in open savanna habitat (3 sites), dense savanna habitat (5 sites), gallery forest habitat (6 sites), flooding forest habitat (1 site) and *Ombrophylus* forest habitat (8 sites). Fish were caught using three gill nets (20 m length, mesh size 30, 50 and 70 mm), 2 throw nets (1.5 m length, mesh size 8 mm) and 3 dip nets (mesh size

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2 mm). Sampling effort was daily with an intensity of three to 12 hours by sampling site, according the stream order. The taxonomy identification was based on keys and descriptions of fish species. Geographic distribution was based in Buckup et al. (2007).

The specimens were identified, preserved in alcohol and deposited in the Ichthyological Collection of the Laboratório de Biologia Pesqueira e Manejo de Recursos Aquáticos of the Universidade Federal do Pará, Brazil.

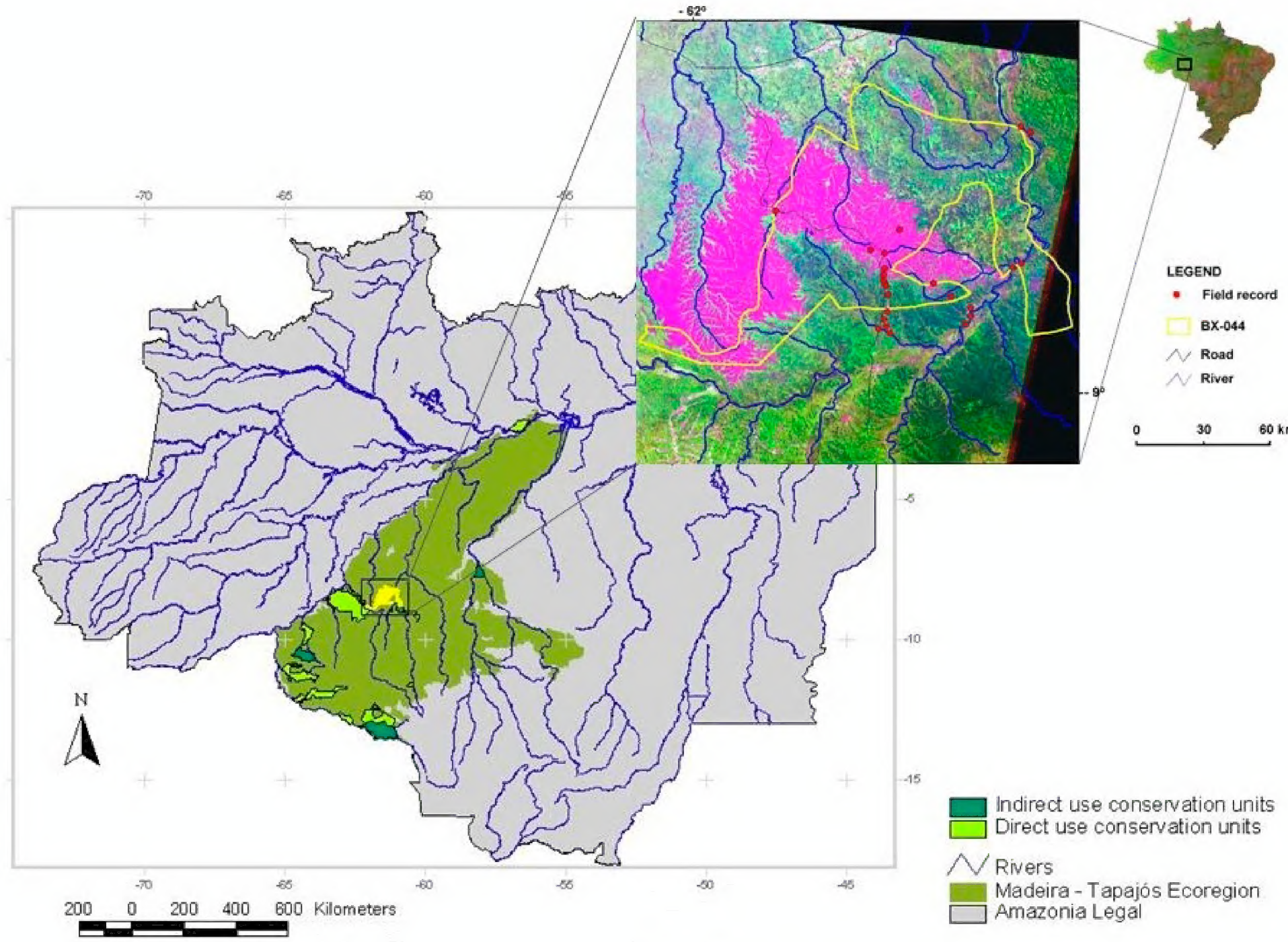

Figure 1. Marmelos River (BX-044) conservation area in the Madeira-Tapajós interfluve.

Results and discussion

A total of 133 fish species belonging to six orders and 24 families were recorded (Table 1) in the BX044 area. The most diverse families were Characidae (47 species), Cichlidae (15 species), Loricariidae (12 species) and Pimelodidae (7 species). The current distribution of endemic species indicates the priority of this area for the conservation of fish fauna biodiversity. Such species include *Leporinus pachycheilus* and *Leporinus trimaculatus* (Anostomidae) recorded at rapids of the Roosevelt River and *Helogenes gouldingi* (Cetopsidae) and *Synbranchus madeirae* recorded on the margins of small streams. Seven potential new undescribed species were recorded for the genus: *Brycon* "cauda preta"; *Bryconops* sp.1 and *Bryconops* sp. 2, *Hydrolicus* sp. 2 and *Gymnotus* sp. 1, sp. 2 and sp. 3. No fish species listed as threatened or endangered (*sensu* IUCN 2006) were recorded in this study.

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The diverse taxonomic composition of the trans-Andean ichthyofauna suggests that Miocene tectonism fragmented the entire aquatic fauna of northwestern South America, leaving a clear signal on all major taxa (Albert et al. 2006). This hypothesis was corroborated by the occurrence of some fish species recorded in the Marmelos conservation area and in other remote systems. For example, *Caenotropus maculatus* (Chilodontidae) in Suriname and Guyana systems; *Apistogramma ortmanni* (Cichlidae) in Essequivo River; *Nannostomus marginatus* (Characidae) and *Aphanotorulus unicolor* (Loricariidae), in the high Amazon (Peru, Colombia, Venezuela) and main tributaries of Guyana and Bolivia; *Cyphocharax multilineatus* (Curimatidae) and *Hemiodus gracilis* (Hemiodontidae) in Negro River and Orinochian System; and *Astyanax longior* and *Axelrodia stigmatias* (Characidae) in the Amazon headwaters.

Table 1. Fish species collected in the Marmelos River (BX044) Conservation Area in the states of Amazonas and Rondônia, Brazil from October to November of 2003.

Order/ Family	Species	Distribution
Characiformes / Acestrorhynchidae	*Acestrorhynchus falcirostris* (Cuvier, 1819)	Am_B, Or, Gy
	Acestrorhynchus microlepis (Schomburgk, 1841)	Am_B, Or, Gy, Sur, Fg
Anostomidae	*Leporinus fasciatus* (Bloch, 1794)	Am_B
	Leporinus friderici (Bloch, 1794)	Sur,
	Leporinus brunneus Myers, 1950	Ne, Or
	Leporinus maculatus Müller & Troschel, 1844	Fg, Sf
	Leporinus pachycheilus Britski, 1976	Ar
	Leporinus desmotes Fowler, 1914	Gy, Sur, Xg
	Leporinus trimaculatus Garavello & Santos, 1992	Ar
	Synaptolaemus cingulatus Myers & Fernandez-Yepez, 1950	Or, Cas, Xg
Characidae	*Agoniates anchovia* Eigenmann, 1914	Tr, Tj,So, Na
	Aphyocharax cf. *alburnus* (Günther, 1869)	Am_b
	Astyanax longior (Cope, 1878)	H_ama
	Astyanax sp.	
	Axelrodia stigmatias (Fowler, 1913)	H_Ama, Ma
	Boulengerella cuvieri (Agassiz, 1829)	Am_b, To, Ess, Gy
	Boulengerella maculata (Valenciennes, 1850)	Am_b, To, Or
	Brycon cephalus (Günther, 1869)	H_Ama
	Brycon sp. "cauda preta"	
	Bryconops affinis (Günther, 1864)	Gy
	Bryconops alburnoides Kner, 1858	Am_B, Or
	Bryconops melanurus (Bloch, 1794)	Gy
	Bryconops sp.	
	Bryconops sp. 1	
	Bryconops sp. 2	
	Ceratobranchia sp.	
	Chalceus macrolepidotus Cuvier, 1817	Ne, Or, Gy
	Cheirodontinae sp. 1	
	Cheirodontinae sp. 2	
	Colossoma macropomum (Cuvier, 1818)	Am_B, Or

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Table 1. Continuation.

Order/ Family	Species	Distribution
Characidae (cont.)	*Copella nattereri* (Steindachner, 1876)	L_Ama, Ne, Or
	Creagrutus melanzonus Eigenmann, 1909	Cu, Sur, Gy
	Hemigrammus analis Durbin, 1909	Ess, Or, Tj, Ne
	Hemigrammus ocellifer (Steindachner, 1882)	Gy, Sur, Am_B
	Hemigrammus sp.	
	Hemigrammus sp. 1	
	Hemigrammus sp. 2	
	Hyphessobrycon heterorhabdus (Ulrey, 1894)	L_Ama
	Iguanodectes geisleri Géry, 1970	Ma, Ne, Or
	Jupiaba anteroides (Géry, 1965)	H_Ama, Cr_Un
	Macropsobrycon sp.	
	Metynnis sp.	
	Moenkhausia ceros Eigenmann, 1908	Am_B
	Moenkhausia grandisquamis (Müller & Troschel, 1845)	Am_B, Or, Fg
	Moenkhausia lepidura (Kner, 1858)	Am_B, Or, Fg
	Moenkhausia sp. 1	
	Myleus cf. *rhomboidalis* (Cuvier, 1817)	Ama_B, Gy
	Myleus cf. *rubripinnis* (Müller & Troschel, 1844)	Ama_b, Or, Gy
	Myleus schomburgkii (Jardine, 1841)	Ama_B, Or, Sur
	Myleus torquatus (Kner, 1858)	Ama_B, Or, Ne
	Roeboides dispar Lucena, 2001	Ma, Ju
	Serrasalmus manueli (Fernández-Yépez & Ramírez, 1967)	Ama_B, Or
	Serrasalmus rhombeus (Linnaeus, 1766)	Ama_B, Or, Gy, Co
	Pygopristis denticulata (Cuvier, 1819)	Or, Gy, L_Am
	Tetragonopterus chalceus Spix & Agassiz, 1829	Ama_B, Sf, Or,
	Tometes sp.	
Chilodontidae	*Caenotropus labyrinthicus* (Kner, 1858)	Ama_b, Or, Sur, Gy
	Caenotropus maculosus (Eigenmann, 1912)	Cu, Sur, Gy
Crenuchidae	*Characidium* sp. 1	
	Characidium zebra Eigenmann, 1909	Am_B,Ess, Gy
	Microcharacidium geryi Zarske, 1997	Uc
Curimatidae	*Curimata cyprinoides* (Linnaeus, 1766)	L_Am, Or, To
	Curimatella dorsalis (Eigenmann & Eigenmann, 1889)	Or, Am_B, To, Pa
	Cyphocharax multilineatus (Myers, 1927)	Or, Ne
	Cyphocharax spilurus (Günther, 1864)	Ne, Br Ess, Gy
	Potamorhina latior (Spix & Agassiz, 1829)	Am_B
Cynodontidae	*Hydrolicus* sp. 2	
	Hydrolycus scomberoides (Cuvier, 1816)	Am_B
Erythrinidae	*Erythrinus erythrinus* (Bloch & Schneider, 1801)	Am_B, Or, Gy
	Hoplerythrinus unitaeniatus (Agassiz, 1829)	SA
	Hoplias cf. *macrophthalmus* (Pellegrin, 1907)	Am_B, Or, Sur, Gy
	Hoplias malabaricus (Bloch, 1794)	CE_SA

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Table 1. Continuation.

Order/ Family		Species	Distribution
	Hemiodontidae	*Argonectes* cf. *longiceps* (Kner, 1858)	Ja, Or, Ma, Ne,Tr, Tj
		Bivibranchia fowleri (Steindachner, 1908)	Ne, To, Xg, Tj, Ma. Ess, Or
		Hemiodus gracilis Günther, 1864	Ne, Tj, Ma, So, Or
		Hemiodus unimaculatus (Bloch, 1794)	Am-B,To, Sur, Oy
	Lebiasinidae	*Copella nattereri* (Steindachner, 1876)	L_Ama,H_Or, N.
		Nannostomus digrammus (Fowler, 1913)	Ma, L_Am, Gy
		Nannostomus marginatus Eigenmann, 1909	Am, Gy, An, Sur
		Pyrrhulina brevis Steindachner, 1876	Am_B
	Prochilodontidae	*Prochilodus nigricans* Spix & Agassiz, 1829	Am-B, To
Clupeiformes /	Engraulidae	*Anchoviella guianensis* (Eigenmann, 1912)	Or, L_gy, Sur, FG, L_Am.
Gymnotiformes /	Gymnotidae	*Gymnotus* sp. 1	
		Gymnotus sp. 2	
		Gymnotus sp. 3	
	Hypopomidae	*Hypopygus lepturus* Hoedeman, 1962	Am_B, Or, Gy
	Rhamphichthyidae	*Gymnorhamphychtys* sp.	
	Sternopygidae	*Eigenmannia virescens* (Valenciennes, 1842)	Or_Pt
Perciformes /	Cichlidae	*Acaronia nassa* (Heckel, 1840)	Am_b
		Aequidens sp. 1	
		Aequidens sp. 2	
		Aequidens tetramerus (Heckel, 1840)	H_Ama (Perú)
		Apistogramma ortmanni (Eigenmann, 1912)	Ess, Pot
		Bujurkina sp.1	
		Bujurkina sp. 2	
		Cichla temensis Humboldt, 1821	Ne, Or, Ua
		Cichla pleizona Kullander & Ferreira 2006	GU
		Crenicichla saxatilis (Linnaeus, 1758)	Sur, FG.
		Geophagus proximus (Castelnau, 1855)	Uc, Sol, Tr
		Geophagus sp.	
		Krobia af. *guianensis* (Regan, 1905)	Gy
		Mesonauta festivus (Heckel, 1840)	Am_B,Gu, Mar, Tj
	Sciaenidae	*Plagioscion squamosissimus* (Heckel, 1840)	Am_B, Or, Sf, Gy, Pa
Siluriformes /	Callichthyidae	*Callichthys callichthys* (Linnaeus, 1758)	SA
		Megalechis thoracata (Valenciennes, 1840)	Am_B, Or, Gy
	Cetopsidae	*Cetopsis* sp.	
		Helogenes gouldingi Vari & Ortega, 1986	Ma
	Heptapteridae	*Chasmocranus brevior* Eigenmann, 1912	FG, Sur,Gy
		Heptapteridae sp.	
		Heptapterus sp.	
	Loricariidae	*Ancistrus* cf. *dolichopterus* Kner, 1854	Am, Tr, Ne, Tj, Ma
		Aphanotorulus unicolor (Steindachner, 1908)	H_Ama
		Dolichancystrus sp.	
		Harttia sp.	
		Hypostomus aff. *levis* (Pearson, 1924)	Mad

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Table 1. Continuation.

Order/ Family	Species	Distribution
Loricariidae	*Lasiancistrus* sp.	
	Microlepidogaster sp.	
	Otocinclus mura Schaefer, 1997	H_Ama
	Panaque cf. *nigrolineatus* (Peters, 1877)	Or, Am_B
	Pseudacanthicus hystrix (Valenciennes, 1840)	Ne, L_am
	Rineloricaria sp.	
	Squaliforma emarginata (Valenciennes, 1840)	Am_B
Pimelodidae	*Leiarius marmoratus* (Gill, 1870)	Am_B, Or
	Phractocephalus hemioliopterus (Bloch & Schneider, 1801)	Am_B, Or
	Pimelodella cristata (Müller & Troschel, 1848)	Fg, Gy
	Pimelodus sp. "olhudo"	
	Pinirampus pirinampu (Spix & Agassiz, 1829)	Am_B, Ess, Or, Pa
	Platysilurus af. *mucosus* (Vaillant, 1880)	Am_b, Or
	Pseudoplatystoma sp. "tigrinus"	Or, Am_B
Trichomycteridae	Trichomycterinae sp.	
	Tricomycterus sp.	
Synbranchiformes / Synbranchidae	*Synbranchus madeirae* Rosen & Rumney, 1972	Mad

Distribution key: Amazon basin (Am_B); Andean (An);. Aripuanã (Ar); Branco (Br); Casiquiare (Cas); Central America (CE); Coastal Brazilian (Co); Cuyuni_Ven. (Cu); Curuá_una (Cr_Un); Essequivo River (Ess); French Guiana (Fg); Guyanas (Gy); Guaporé – Bol. (Gu); High Amazon (H_Ama); Japurá (Ja); Juruá (Ju); La Plata System (Pt); Lower Amazon (L_Ama); Low guianas (L_Gy); Madeira (Mad); Mamoré – Bol. (Mar); Maroní (Ma); Napo (Na); Negro (Ne); Orinoco System (Or); Oyapock (Oy); Paraná (Pa); Potaro (pot); São Francisco (Sf); Solimões (So); South America (SA); Suriname (Sur); Tapajós (Tj); Tocantins (To); Trombetas (Tr); Ucayali (Uc); Xingu (Xg).

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